

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of producing Simonkolleite comprising the steps of:
providing a high concentration chloride solution including zinc chloride complex;
and

adding water to the high concentration chloride solution to reduce the chloride concentration in the high concentration chloride solution so as to produce a reduced concentration chloride solution having a specific gravity less than 1.45, wherein adding said water results in at least 30% of said zinc chloride complex precipitating out of the reduced concentration chloride solution as Simonkolleite and zinc oxide/hydroxide.

2. A process for producing zinc oxide comprising the steps of:
providing an oxychloride slurry containing Simonkolleite or other oxychlorides;
adding water to the oxychloride slurry; and
adding a base to the water and oxychloride slurry to produce zinc oxide having a purity of at least 98% and containing less than 2000 ppm chlorides.

3. A zinc oxide manufacturing process comprising the steps of:
providing a metals bearing feed stock;
providing a chloride leach solution with a specific gravity in a range of 1.45 to 1.55;

reacting the metals bearing feed stock and the chloride leach solution to form a complex solution including a metal chloride complex and calcium hydroxide;

adding water to the complex solution to reduce a chloride concentration in the complex solution so as to produce a cementation solution having a specific gravity within a range of 1.40 to 1.49;

adding zinc to said cementation solution, wherein said zinc added to said cementation solution is below the metal in the metal chloride complex on the

electrochemical replacement series such that the zinc added to the cementation solution will substitute with the metal in the metal chloride complex to form a zinc chloride complex and such that the metal substituted out of the metal chloride complex will cement out of the cementation solution;

adding water to the zinc chloride complex to produce a zinc chloride complex solution having a reduced chloride concentration with a specific gravity within a range of 1.37 to 1.45, wherein adding said water results in at least 30% of said zinc chloride complex precipitating out of the zinc chloride complex solution as Simonkolleite;

adding a base to the zinc chloride complex solution wherein adding said base results in at least an additional 60% of said original zinc chloride complex precipitating out of the zinc chloride complex solution as Simonkolleite/zinc oxychloride; and

adding water to the Simonkolleite to produce a Simonkolleite solution; and

adding a base to the Simonkolleite solution to produce zinc oxide having a purity of at least 98% and containing less than 1,000 ppm chlorides.